

REMARKS

This amendment amends Claims 8 and 19, Figures 2 and 3, and the headings throughout the specification. The amendments present no new matter and they present no new issues. Now in the application are Claims 1-51 of which Claims 1, 8, 13, 21, 33, and 45 are independent.

Claim Amendments:

Claims 8 and 19 are amended to correct typographical errors. The amendments to Claims 8 and 19 are not meant to address any art rejections, therefore, Applicants understand that any further rejection of the claims with any new art is to be non-final. Specifically, Claim 8 is amended to remove the article “a” in line 10, and Claim 19 is amended to provide proper antecedent basis for the recited “second structure”.

Amendments to the Figures:

Figures 2 and 3 are amended to correct draftsmen’s errors. Specifically, Figure 2 is amended to correct the misspelling of “storage” in Step 30. Figure 3 is amended to replace reference designator “80” with reference designator “79”, in compliance with the text of the specification.

Amendments to the Specification:

The section headings throughout the specification are amended to appear in upper case lettering in accordance with 37 C.F.R. § 1.77(b).

Claim Rejections under 35 U.S.C. § 112

IA. Rejection of Claims 6, 18, 31, and 34 under 35 U.S.C. § 112, first paragraph:

Claims 6, 18, 31 and 43 stand rejected under 35 U.S.C. § 112, first paragraph for allegedly failing to comply with the enablement requirement. Specifically, the Examiner contends the recitation “without a volume manager facility” in each of these claims is not described in the specification in such a way as to enable one skilled in the art to make or use the invention. Applicants’ respectfully disagree.

Applicants' contend that the Examiner has failed to meet his burden of establishing on the record a reasonable basis for questioning the adequacy of the disclosure to enable a person of ordinary skill in the art to make and use the claimed invention without resorting to undo experimentation. Those skilled in the art will recognize that volume management through the use of a volume manager is traditionally associated with large installations containing many discs or storage devices although the use of a volume manager is equally well suited for managing small systems with a single disc or storage device. Nevertheless, those skilled in the art will further recognize that volume management without the use of a volume manager is possible in large installations containing many discs or storage devices without undo experimentation although the use of a volume manager does facilitate an administrators tasks.

Applicants respectfully submit that the purpose of a volume manager is to provide a higher level view of the disc storage on a computer system to provide, in part, a system administrator with greater flexibility in allocating storage to applications and users. Hence, a volume manager facilitates the management of storage space. Thus, one skilled in the art will recognize that a volume manager is an optional application and that some storage systems have a volume manager while other storage systems do not.

Accordingly, Applicants' respectfully submit that Claims 6, 18, 31, and 43 comply with the enablement requirement under 35 U.S.C. § 112, first paragraph. Accordingly, Applicants' respectfully request the Examiner to reconsider and withdraw the rejection of Claims 6, 18, 31 and 43 under 35 U.S.C. § 112, first paragraph.

IB. Rejection of Claim 12 under 35 U.S.C. § 112, first paragraph:

Claim 12 stands rejected under 35 U.S.C. § 112, first paragraph for allegedly failing to comply with the enablement requirement. Specifically, the Examiner contends that the recitation of "without a volume manager" was not described in the specification in such a way as to enable one skilled in the art to which it pertains to make and use the invention. Applicants' respectfully disagree.

Applicants' contend that the Examiner has failed to meet his burden of establishing on the record a reasonable basis for questioning the adequacy of the disclosure to enable a person of ordinary skill in the art to make and use the claimed invention without

resorting to undo experimentation. Those skilled in the art will recognize that volume management through the use of a volume manager is traditionally associated with large installations containing many discs or storage devices although the use of a volume manager is equally well suited for managing small systems with a single disc or storage device. Nevertheless, those skilled in the art will further recognize that volume management without the use of a volume manager is possible in large installations containing many discs or storage devices without undo experimentation although the use of a volume manager does facilitate an administrators tasks.

Applicants respectfully submit that the purpose of a volume manager is to provide a higher level view of the disc storage on a computer system to provide, in part, a system administrator with greater flexibility in allocating storage to applications and users. Hence, a volume manager facilitates the management of storage space. Thus, one skilled in the art will recognize that a volume manager is an optional application and that some storage systems have a volume manager while other storage systems do not.

Accordingly, Applicants' respectfully submit that Claim 12 complies with the enablement requirement under 35 U.S.C. § 112, first paragraph. Accordingly, Applicants' respectfully request the Examiner to reconsider and withdraw the rejection of Claim 12 under 35 U.S.C. § 112, first paragraph.

Claim Rejections under 35 U.S.C. § 102

Claims 1-4, 6-10, 12-16, 18, 20-23, 25-29, 31-35, 37-41, 43-46, and 48-50 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,629,264 of Sicola, *et al.* (hereinafter "Sicola"). Applicants' respectfully traverse each of these rejections. For purposes of clarity in the discussion below, each of the respective related claim sets are discussed separately.

IIA. Rejection of Claims 1-4, 6, 7, 13-16, 18, 20, under 35 U.S.C. § 102(e):

Claims 1-4, 6 and 7 are directed to a method for replicating data practiced in a storage network. The method identifies to a first data replication facility at a first programmable electronic device in the storage network, a first structure and a second

structure held by a storage device locally accessible to the first programmable electronic device. Performance of the method further instructs the first data replication facility to logically group the first and second structure to create a group. At the appropriate time, the first data replication facility generates a replica of the group and forwards the replica in accordance with a communication protocol to a second data replication facility at a second programmable electronic device in the storage network for storage by a second storage device.

Claims 13-16, 18, and 19 are computer readable medium claims that parallel Claims 1-4, 6, and 7.

Claims 1-4, 6, 7, 13-16, 18, and 20 are not anticipated by Sicola. Sicola does not perform the steps of logically grouping a first and second data structure held by a local storage device as a group and generating a replica of the group at the first data replication facility. Sicola is concerned with “failover”. That is, an underlying operational concept of Sicola is the pairing of volumes between a local storage array and a remote storage array. The pairing of a local volume and a remote volume is referred to throughout Sicola as a “remote copy set”. Sicola defines a remote copy set as consisting of two same sized volumes, one on the local array, and one on the remote array. *See*, column 8, lines 51-57 of Sicola.

Sicola further discloses an association set. Sicola defines an association set as a group of logical units (i.e. a set of one or more remote copy sets) on a local or remote pair of array controllers with attributes for logging and failover selectable by a system user. *See*, column 19, lines 58-61 of Sicola. That is, association sets are used by a host to keep multiple units consistent with each other to ensure, for example, that an applications data set remains consistent. This requires that if one member fails, host access is removed from all members, and I/O order is kept across all members. For each array controllers point of view, an association set is the grouping of remote copy sets that all transition to the same state at the same time. *See*, column 20, lines 19-26 of Sicola. That is, Sicola is concerned with failover so that if a local volume fails the corresponding remote volume fails at the same time to ensure a point in time consistency on the remote site. Nowhere does Sicola disclose generating a replica of a group comprising a logically grouped first

structure and second structure from a storage device locally accessible to the data replication facility.

In contrast to Sicola, Claims 1-4, 6, 7, 13-16, 18, and 20 recite steps of instructing the first data replication facility to logically group the first and second structure from the locally accessible storage device to create a group and generating a replica of the group at the first data replication facility. Nowhere does Sicola disclose such steps. Sicola groups remote copy sets to form association sets. Sicola defines remote copy sets as a set of matching volumes located on a local host and a remote host. Sicola does not disclose the logical grouping of a first and second structure held by a local storage device to create a group and generating a replica of the group for forwarding to a remote storage device. Hence, Sicola fails to anticipate Claims 1-4, 6, 7, 13-16, 18 and 20. Accordingly, Applicants' respectfully request the Examiner to reconsider and withdraw the rejection of Claims 1-4, 6, 7, 13-16, 18 and 20 under 35 U.S.C. § 102(e).

IIB. Rejection of Claims 8-10 and 12 under 35 U.S.C. § 102(e):

Claims 8-10 and 12 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Sicola. Applicants' respectfully traverse this rejection and further contend that the invention defined by these claims distinguishes patentability over the Sicola patent.

Claims 8-10 and 12 are directed to a method for replicating data in a storage network to update one or more data structures of a remote storage device. Performance of the method instructs a first data replication facility of a first electronic device in the storage network to logically associate a first data structure and a second data structure held by a locally accessible storage device. The logical association defines a group. Further performance of the method generates a replica of the first data structure and the second data structure as a group and outputs the replica from the first replication facility to a second replication facility of a second electronic device in the storage network to update one or more data structures of the remote storage device.

Sicola does not anticipate Claims 8-10 and 12. Sicola does not disclose a logical association between a first data structure and a second data structure held by a locally accessible storage device. Furthermore, Sicola does not disclose generating a replica of the first data structure and the second data structure as a group. Sicola, in contrast to

Claims 8-10 and 12, logically associates a data structure on a local storage device and a data structure on a remote storage device. Nowhere does Sicola disclose the logical association of two data structures held by a local storage device and generating a replica of the two logically associated data structures as a group for outputting to a remote storage device. Sicola is concerned with failover and therefore logically associates a local data structure and a remote data structure so if one of the structures encounters a failure both the local and remote structures are prevented from being written into to create a point in time consistency between the local and remote data storage devices. Sicola does not anticipate Claim 8-10 and 12.

Hence, Applicants' respectfully request the Examiner to reconsider and withdraw the rejection of Claims 8-10 and 12 under 35 U.S.C. § 102(e).

IIC. Rejection of Claims 21-23, 25-29, 31-35, 37-41, 43 and 44 under 35 U.S.C. § 102(e):

Claims 21-23, 25-29, 31-35, 37-41, 43 and 44, stand rejected under 35 U.S.C. § 102(e) as being anticipated by Sicola. Applicants' respectfully traverse this rejection and contend that Sicola does not anticipate these claims, as discusses below.

Claims 21-23, 25-29, 31 and 32 are directed to a method that is practiced in a storage network to create a replica of selected data. In the storage network, performance of the method instructs a first data replication facility at a first electronic device in the storage network to track changes to one or more storage locations of a first storage medium corresponding to the selected data. Further performance of the method instructs the first data replication facility to generate a replica of the selected data based on the tracked changes to the one or more locations of the first storage medium. The replica is placed in a data structure and the replica is forwarded in accordance with a communication protocol from the data structure to a second data replication facility. The second data replication facility being located at a second electronic device in the storage network. The second electronic device stores the replica on a second storage medium. The Sicola patent fails to disclose each and every element recited in Claims 21-23, 25-29, 31-35, 37-41, 43 and 44.

Claims 33-35, 37-41, 43 and 44 are readable medium claims that parallel Claims 21-23, 25-29, 31 and 32.

Claims 21-23, 25-29, 31-35, 37-41, 43 and 44 are not anticipated by Sicola. The Examiner cites Column 12, lines 17-59 of Sicola as anticipating these claims. The cited passage discloses an asynchronous operation that includes a peer-to-peer remote copy software manager that “micro-logs” write transfer LBN extent in a controller’s non-volatile right back cash “micro-log”. Sicola carries out this micrologging in all situations in the event the initiator controller crashes after status is returned to the host but before the remote copy completes. That is, Sicola micro-logs each asynchronous transfer. However, the micro-log information is used only when the controller crashes with outstanding remote copies (or with outstanding logging unit writes). The micro-log contains information to reissue the remote copies by another controller. *See*, column 12, lines 27-43 of Sicola. The Examiner asserts that this passage from Sicola discloses the method performed in a storage network to create a replica of selected data in the storage network recited in Claim 21. The cited passage from column 12 of Sicola indicates that Sicola logs every write so that in the event of error and only in the event of an error the system of Sicola reads the micro-log in order to complete a remote copy operation.

In contrast to the cited passage of Sicola, Claim 21 recites a method that includes a step of instructing a first data application facility at a first electronic device in the storage network to track changes to one or more storage locations of a first storage medium that correspond to selected data. Further, the method of Claim 21 recites a step of instructing the first data replication facility to generate a replica of the selected data based on the track changes to the one or more locations of the first storage medium. Nowhere does Sicola disclose such steps. Sicola does not rely on the micro-log to generate a replica of selected data based on track changes to one or more locations of the storage medium. Hence, Sicola does not anticipate Claims 21, 25-29, 31-35, 37-41, 43 and 44. Accordingly, Applicants’ respectfully request the Examiner to reconsider and withdraw the rejection of Claims 21, 25-29, 31-35, 37-41, 43 and 44 under 35 U.S.C. § 102(e).

IID. Rejection of Claims 45, 46, and 48-50 under 35 U.S.C. § 102(e):

Claims 45, 46, and 48-50 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Sicola. Applicants' respectfully traverse this rejection and further contend that Sicola does not anticipate these claims, as discussed below.

Claims 45, 46, and 48-50 are directed to a method for replicating data in a distributed network to update a remote storage device with data from a local storage device. The method is performed by instructing a first data replication facility of a first electronic device in the distributed network to track one or more locations of a local storage device that correspond to one or more identified volumes. Further performance of the method groups each of the one or more identified volumes into a group by the first data replication facility, and generates a replica of the group at the first data replication facility. In turn, the replica is asserted in accordance with a communication protocol toward a second replication facility of a second electronic device in the distributed network to update the remote storage device. The Sicola patent does not anticipate Claims 45, 46 and 48-50.

In the Office Action, the Examiner interprets group as recited in Claim 45 as corresponding to set as discussed in column 20, lines 17-34 of Sicola. Sicola defines a set as one or more remote copy sets. *See*, column 19, lines 58-61 of Sicola. A remote copy set consists of two volumes of the same size, one on the local array and one on the remote array. *See*, column 8, lines 55-57. Sicola does not disclose the steps of instructing a first data replication facility of a first electronic device in the distributed network to track one or more locations of a local storage device that corresponds to one or more identified volumes and grouping each of the one or more identified volumes into a group by the first data replication facility. The step of grouping in Claim 45 allows the method to treat one or more identified volumes on a local storage device as a single entity. This facilitates the generation of a replica of the group and assertion of the replica toward a second replication facility of a second electronic device in the distributed network to update the remote storage device.

In contrast, Sicola associates a volume on a local storage device with a volume on a remote storage device to insure a consistent point in time in the event a failure occurs when writing to either the local volume or the remote volume. Sicola does not disclose

grouping one or more identified volumes associated with a local storage device into a group by a data replication facility. Hence, Sicola does not anticipate Claims 45, 46 and 48-50. Accordingly, Applicants' respectfully request the Examiner to reconsider and withdraw the rejection of Claims 45, 46 and 48-50 under 35 U.S.C. § 102(e).

Claim Rejections under 35 U.S.C. § 103

Claims 5, 11, 17, 19, 24, 30, 36, 42, 47, and 51 stand rejected under 35 U.S.C. § 103(a). Applicants' respectfully traverse each of these rejections as discussed below. For purposes of clarity in the discussion below, each respective related claim set is discussed separately.

IIIA. Rejection of Claims 5 and 17 under 35 U.S.C. § 103(a):

Claims 5 and 17 stand rejected under U.S.C. § 103(a) as being unpatentable over Sicola in view of U.S. Patent No. 6,324,654 of Wall, *et al.* (hereinafter "Wall"). Applicants' respectfully traverse this rejection and further contend that Claims 5 and 17 are patentable over the Sicola patent or the Wall patent, alone or in combination.

The Wall patent is cited for teaching or suggesting the claimed communication protocol comprises the transmission control protocol/internet protocol (TCP/IP) protocol suite.

Claim 5 depends on Claim 1 and therefore incorporates the patentable features of Claim 1. Claim 17 is a readable medium claim that parallels Claim 5.

The citation of Wall patent fails to cure the factual deficiencies of the Sicola patent. Wall is cited for teaching or suggesting the communication protocol recited in Claim 1 comprises the TCP/IP suite of protocols. The Wall patent is not cited for teaching or suggesting the logical grouping of a first data structure and a second data structure from a storage device locally accessible to a first programmable electronic device. The Sicola patent in view of the Wall patent fails to detract from the patentability of Claims 5 and 17. Accordingly, the allowance of Claims 5 and 17 are in order.

IIIB. Rejection of Claim 19 under U.S.C. § 103(a):

Claim 19 stands rejected under U.S.C. § 103(a) as being unpatentable over Sicola in view of Wall. Applicants' respectfully traverse this rejection and further contend that Claim 19 is patentable over the Sicola patent or the Wall patent, alone or in combination.

Claim 19 is patentable for at least the same reasons set forth above regarding Claim 13, from which it depends. The Wall patent is cited for teaching or suggesting a first structure includes a first group of records and a second structure includes a second group of records. Nonetheless, the Wall reference fails to bridge the factual deficiencies of the Sicola reference. Sicola, as discussed above in connection with the rejection of Claim 13 under 35 U.S.C. § 102 fails to disclose each and every element of Claim 13. As such, neither Sicola nor Wall detract from the patentability of Claim 19. Accordingly, the allowance of Claim 19 is in order.

IIIC. Rejection of Claim 11 under U.S.C. § 103(a):

Claim 11 stands rejected under U.S.C. § 103(a) as being unpatentable over Sicola in view of Wall. Applicants' respectfully traverse this rejection and further contend that neither Sicola nor Wall, alone or in combination, teach or suggest each and every element of Claim 11.

Claim 11 is patentable for the same reasons set forth above regarding Claim 8, from which it depends. The Wall reference is cited for teaching or suggesting the communication protocol recited in Claim 8 include the TCP/IP suite of protocols. Nonetheless, the Sicola patent in view of the Wall patent fails to disclose each and every element recited in Claim 8. Accordingly, the Sicola patent in view of the Wall patent fails to establish a *prima facie* case of obviousness for use in detracting from the patentability of Claim 11. Accordingly, the allowance of Claim 11 is in order.

IIID. Rejection of Claims 30 and 42 under 35 U.S.C. § 103(a):

Claims 30 and 42 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the Sicola patent in view of the Wall patent. Applicants' respectfully traverse this

rejection and further contend that neither the Sicola patent nor the Wall patent teach or suggest each and every element of these claims. Claim 42 is a readable medium claim that parallels Claim 30. Claim 30 is patentable for the same reasons set forth above regarding Claim 21, from which it depends.

The Wall patent is cited for teaching or suggesting the communication protocol recited in Claim 21 includes the TCP/IP suite of protocols. Nonetheless, the Sicola patent in view of the Wall patent fails to teach or suggest each and every element of Claim 30. Accordingly, the allowance of Claims 30 and 42 are in order.

IIIE. Rejection of Claims 24 and 36 under 35 U.S.C. § 103(a):

Claims 24 and 36 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sicola in view of U.S. Patent No. 6,209,002 of Gagne, *et al.* (hereinafter “Gagne”). Applicants’ traverse this rejection and further contend that neither Sicola nor Gagne alone or in combination, detract from the patentability of these claims.

Claim 24 is patentable for at least the same reasons set forth above regarding Claim 21, from which it depends. Claim 36 is a readable medium claim that parallels Claim 24.

The Gagne patent is cited for teaching or suggesting the packaging with the replica of selected data information that identifies a storage location for the replica of the selected data at the remote cite. Nevertheless, as discussed above in connection with the rejection of Claim 21, the Sicola patent does not disclose each and every feature of Claim 21. The Gagne patent does not bridge the factual deficiencies of the Sicola patent and therefore, the Sicola reference in view of the Gagne reference fail to establish a *prima facie* case of obviousness for use in detracting from the patentability of Claims 24 and 36. Accordingly, the allowance of Claims 24 and 36 are in order.

IIIF. Rejection of Claims 47 and 51 under 35 U.S.C. § 103(a):

Claims 47 and 51 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sicola in view of Gagne. Applicants’ respectfully traverse this rejection and further contend that neither Sicola nor Gagne, alone or in combination, detract from the patentability of these claims. Claim 47 is patentable for at least the same reasons set


forth above regarding Claim 45, from which it depends. Claim 51 is patentable for at least the same reasons set forth above regarding Claim 45 from which it depends.

The Gagne reference is cited for teaching or suggesting the packaging of information with the replica that indicates a storage location for each volume in the replica for storage on the remote storage device. Nonetheless, the Sicola reference as discussed above in connection with the rejection of Claim 45 does not disclose each and every element of Claim 45. Accordingly, the cited combination of Sicola in view of Gagne fail to detract from the patentability of Claims 47 and 51. Accordingly, the allowance of Claims 47 and 51 are in order.

CONCLUSION

In view of the remarks set forth above, Applicants contend that Claims 1-51 presently pending in this application, are patentable, and in condition for allowance. If the Examiner deems there are any remaining issues, we invite the Examiner to call the undersigned at (617) 227-7400.

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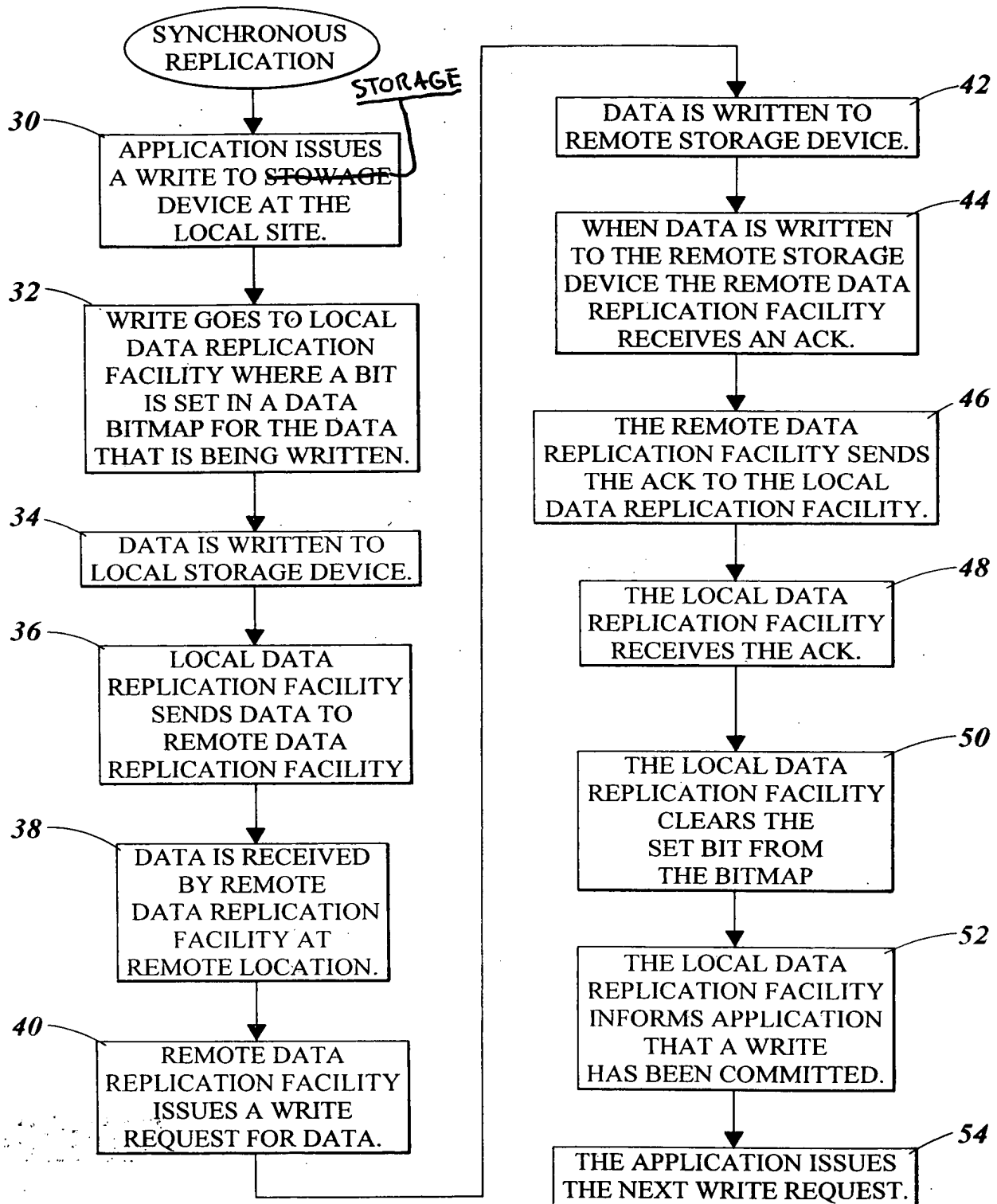


FIG. 2



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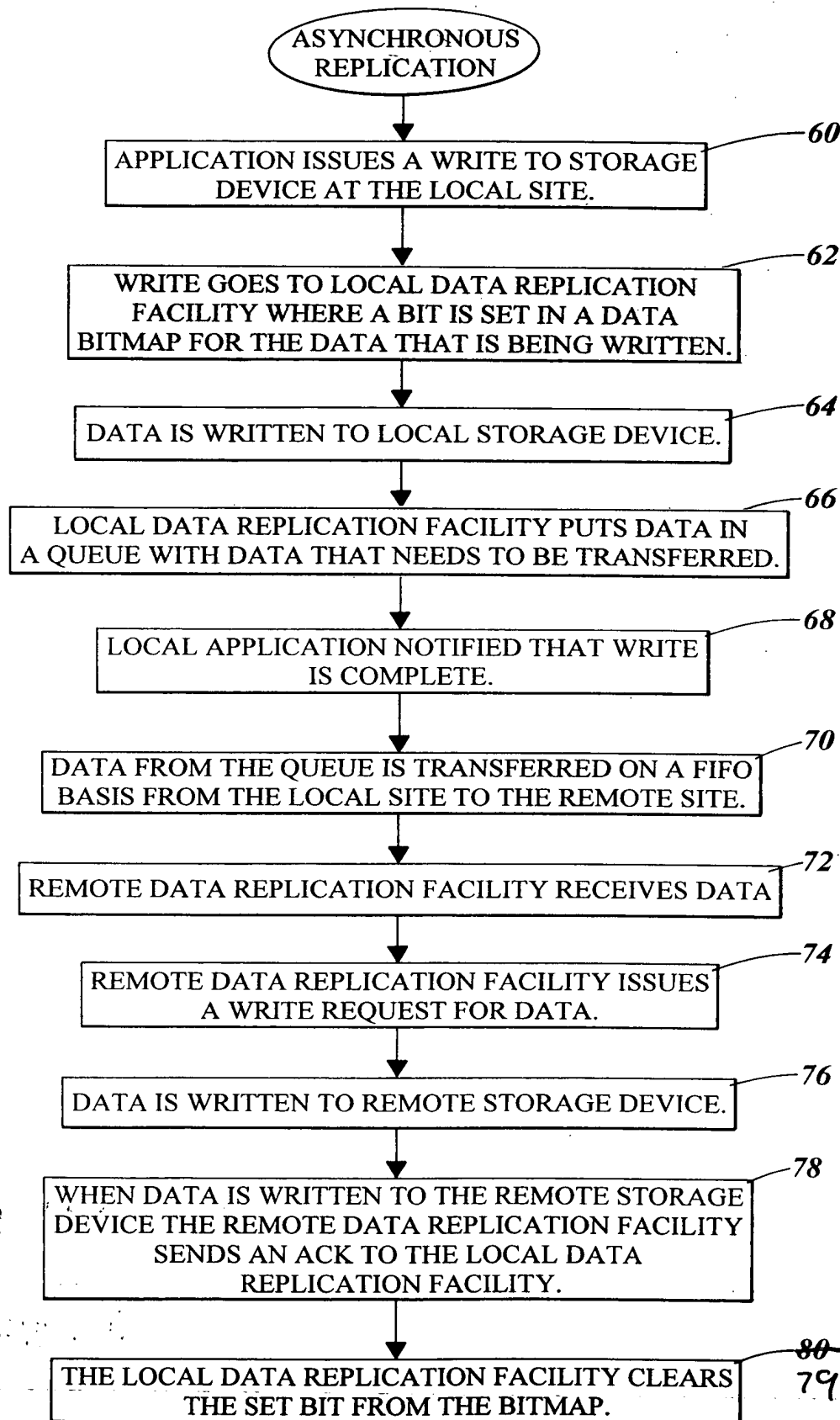


FIG. 3